

The Specter of Fuel-Based Lighting

A Dramatic Opportunity for Technology Leapfrogging in the Developing World

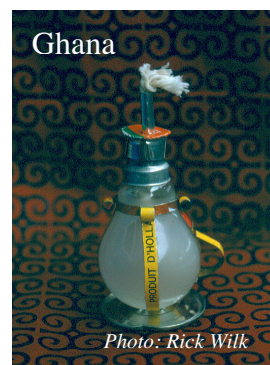
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http://eetd.lbl.gov/emills/PUBS/Fuel_Based_Lighting.html

Contemporary questions of energy, environment, and equity converge in unusual and unexpected ways around a technology that seems to be of the past but is very much a part of the present: fuel-based lighting in the developing world.



Market - Viet Nam



Shopkeeper
India (Asam)

Thomas Edison's seemingly forward-looking statement that "we will make electricity so cheap that only the rich will burn candles" was true enough for the industrialized world, but it did not anticipate the plight of 2 billion people—more than the world's population in Edison's time—who 100 years later still have no access to electricity. According to the World Bank, 24% of the urban population and 67% of the rural population in developing countries are without electricity.

Based on preliminary estimates from LBNL, global household-sector use of fuel-based lighting is responsible for annual energy consumption of 96 billion liters of kerosene (or 3603 petajoules, PJ).¹ This equates to 1.7 million barrels of oil per day, comparable to the total production of Algeria, Brazil,

Indonesia, or Libya.



Kerosene Sellers - Bhutan



Barber - India

Fuel use for lighting outside the home (shops, night markets, etc.) or in areas that experience regular power outages would add to these sums.

The cost of this energy is ~US\$50 billion/year, or approximately \$100 per household. This is on a par with that in electrically lit homes globally.

¹ See Mills, E. 2002. "The \$230-billion Global Lighting Energy Bill." *Proceedings of the First European Conference on Energy-Efficient Lighting*, International Association for Energy-Efficient Lighting, Stockholm, pp. 368-385. see http://eetd.lbl.gov/emills/PUBS/Global_Lighting_Energy.html

Fuel-based lighting also results in 240 million metric tonnes of carbon dioxide emissions to the atmosphere each year, greater than the total emissions of Australia or the UK.



Textile Shop - India

Remarkably, although one in three people obtain light with kerosene and other fuels, representing about 50% of global household lighting costs, they receive only 0.2% of the resulting lighting energy services (i.e. lumens).

Emerging, 1-watt high efficiency light-emitting-diode (LED) technologies could significantly improve the quality and quantity of illumination, while reducing

costs and emissions dramatically from present levels. A 1-watt LED cluster requires 95% less power than energy-efficient compact fluorescent lamps and can be run on approx. one square foot of solar photovoltaic panels or small pico-hydro systems. This represents an unprecedented opportunity for technology leapfrogging in developing countries, and would help condition world markets for the impending LED lighting revolution.

Many imperatives—aside from energy considerations—drive the need for addressing fuel-based lighting. Oil import dependency is generally high in developing countries, draining valuable hard currency. By virtue of its inefficiency, fuel-based light is hard to work or read by, imposes a high cost on very poor households, and compromises indoor air quality and literacy. Women are typically saddled with the burden of obtaining kerosene, which often involves walking long distances. Kerosene pricing and subsidies are often the source of political and social unrest, hoarding, and scarcity.



Tailor - India
(Asam)



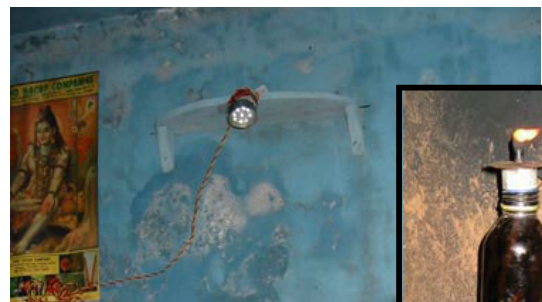
Night Market
Cambodia



Hmong Lamp
Seller – VietNam



Night Seller -India



Photos by
Evan Mills,
unless noted



Child Reading by 1-Watt LED Set
(Courtesy Irvine-Halliday & Craine)